CLAIMS

1. A method of receiving a spread-spectrum signal, the method comprising correlating the received spread-spectrum signal with a reference signal to detect the presence of one of a number of reference spreading codes;

wherein the correlating further comprises performing at least one of the following steps resulting in a differentiated correlation signal:

- differentiating the received spread-spectrum signal and the reference signal; and
- differentiating the correlation signal;

and wherein the differentiated correlation signal comprises a sequence of signal samples, each signal sample having a complex value.

2. A method according to claim 1, wherein the method further comprises detecting a frequency error of the received spread-spectrum signal from the differentiated correlation signal.

3. A method according to claim 1 or 2, further comprising accumulating the differentiated correlation signal to obtain a correlation value.

4. A method according to claim 3, further comprising detecting a frequency error from the determined correlation value.

5. A method according to claim 4, further comprising determining a frequency compensation factor from the angle argument of the correlation value.

6. A method according to any one of claims 3 through 5, wherein accumulating comprises coherently accumulating the differentiated correlation signal.

7. A method according to claim 6, wherein the received spread-spectrum signal comprises a digital information message encoded as bits, wherein bit transitions of the digital information message occur at predetermined transition time intervals; and wherein coherently accumulating comprises coherently accumulating the differentiated correlation signal over a time interval that is longer than half the transition time interval.

8. A method according to any one of claims 1 through 7, wherein differentiating comprises differentiating on a single-chip time scale.

9. A method according to any one of claims 1 through 8, wherein differentiating a signal comprises delaying the signal by a predetermined number of chips.

10. A method according to any one of claims 1 through 9, comprising

- providing a plurality of reference signals modulated by said one of a number of reference spreading codes and delayed by respective relative code delays;
- correlating the received spread-spectrum signal with the plurality of reference signals to obtain a corresponding plurality of differentiated correlation signals;
- accumulating each of the plurality of differentiated correlation signals to obtain a corresponding plurality of correlation values for respective code delays; and
- detecting a correlation peak in the plurality of correlation values to identify a code delay of the received spread-spectrum signal.

11. A method according to any one of claims 1 through 10, comprising

- correlating the received spread-spectrum signal with a plurality of reference signals, each modulated by a corresponding one of the

number of reference spreading codes, to obtain a corresponding plurality of differentiated correlation signals;

- accumulating each of the plurality of differentiated correlation signals to obtain a corresponding plurality of correlation values for respective reference spreading codes; and
- detecting a correlation peak in the plurality of correlation values to identify a spreading code of the received spread-spectrum signal.

12. A method according to any one of claims 1 through 11, further comprising de-spreading the received spread-spectrum signal; and extracting information data from the de-spread signal.

13. A method according to any one of claims 1 through 12, wherein the correlating comprises

- differentiating the received spread-spectrum signal and the reference signal to obtain a differentiated received signal and a differentiated reference signal; and
- determining the differentiated correlation signal from the differentiated received signal and the differentiated reference signal.

14. A method according to any one of claims 1 through 13, wherein the correlating comprises

- determining a correlation signal from the received spread-spectrum signal and the reference signal; and
- differentiating the correlation signal to obtain the differentiated correlation signal.

15. A method according to any one of claims 1 through 14, wherein differentiating a signal comprises multiplying a signal sample of the signal with the complex conjugate of a preceding signal sample.

16. A method according to any one of claims 1 through 15, wherein the reference signal is modulated at a predetermined chip rate by a reference spreading code comprising a predetermined sequence of code chips; wherein the correlating comprises sampling the reference spread-spectrum signal resulting in a sequence of received signal samples; wherein the reference signal comprises a sequence of reference samples; and wherein the correlating comprises

- correlating samples of the sequence of received signal samples with samples of the sequence of reference samples to obtain a sequence of correlation samples; and
- accumulating samples of at least a sub-sequence of the sequence of correlation samples to obtain a correlation value.

17. A method according to claim 16, wherein correlating samples of the sequence of received signal samples with samples of the sequence of reference samples further comprises

- differentiating the sequence of received signal samples and the sequence of reference samples;
- multiplying the differentiated sequence of received signal samples with the differentiated sequence of reference samples to obtain the sequence of correlation samples.

18. A method according to claim 16, wherein correlating samples of the sequence of received signal samples with samples of the sequence of reference samples further comprises

- multiplying the sequence of received signal samples with the sequence of reference samples to obtain a sequence of multiplied samples; and
- differentiating the sequence of multiplied samples to obtain the sequence of correlation samples.

19. A method according to any one of claims 1 through 18, wherein the spreading code is indicative of one of a number of signal sources.

20. A method according to claim 19, wherein the signal source is one of a number of space vehicles of a positioning system.

21. A method according to claim 20, wherein the positioning system is GPS.

22. A method according to any one of claims 1 through 21, wherein the spreading code is a pseudo-random-noise code.

23. A method according to any one of claims 1 through 21, wherein the spreading code is a Gold code.

24. An arrangement for receiving a spread-spectrum signal, the arrangement comprising correlation means (105) for correlating the received spread-spectrum signal with a reference signal to detect the presence of one of a number of reference spreading codes; wherein the correlation means is adapted to generate a differentiated correlation signal and comprises at least one of

- means (408) for differentiating the correlation signal; and
- means (306,400) for differentiating the received spread-spectrum signal and the reference signal;

and wherein the differentiated correlation signal comprises a sequence of signal samples, each signal sample having a complex value.

25. An arrangement according to claim 24, further comprising means (309) for detecting a frequency error of the received spread-spectrum signal from the differentiated correlation signal.

26. An arrangement according to claim 24 or 25, further comprising accumulator means (305) for accumulating the differentiated correlation signal to obtain a correlation value.

27. An arrangement according to claim 26, further comprising means (309) for detecting a frequency error of the received spread-spectrum signal from the differentiated correlation signal; wherein the means for detecting the frequency error is adapted to detect the frequency error from the determined correlation value.

28. An arrangement according to claim 27, further comprising means (312) for determining a frequency compensation factor from the angle argument of the correlation value.

29. An arrangement according to any one of claims 26 through 28, wherein the received spread-spectrum signal comprises a digital information message encoded as bits, wherein bit transitions of the digital information message occur at predetermined transition time intervals; and wherein the accumulator means is adapted to coherently accumulate the differentiated correlation signal over a time interval that is longer than half the transition time interval.

30. An arrangement according to any one of claims 24 through 29,

wherein the arrangement further comprises means (410) for providing a plurality of reference signals modulated by said one of a number of reference spreading codes and delayed by respective relative code delays;

wherein the correlation means is adapted to correlate the received spread-spectrum signal with the plurality of reference signals and to generate a corresponding plurality of differentiated correlation signals; and

wherein the arrangement further comprises accumulator means (305) for accumulating each of the plurality of differentiated correlation signals and for generating a corresponding plurality of correlation values for respective code delays; and peak detection means (308) for detecting a correlation peak in the plurality of correlation values and for identifying a code delay of the received spread-spectrum signal.

31. An arrangement according to any one of claims 24 through 30,

wherein the correlation means is adapted to correlate the received spread-spectrum signal with a plurality of reference signals, each modulated by a corresponding one of the number of reference spreading codes, and to generate a corresponding plurality of differentiated correlation signals; and

wherein the arrangement further comprises accumulator means (305) for accumulating each of the plurality of differentiated correlation signals and for generating a corresponding plurality of correlation values for respective reference spreading codes; and peak detection means (308) for detecting a correlation peak in the plurality of correlation values and for identifying a spreading code of the received spread-spectrum signal.

32. An arrangement according to any one of claims 24 through 31,

wherein the means for differentiating is adapted to differentiate the received spread-spectrum signal and the reference signal and to generate a differentiated received signal and a differentiated reference signal; and

wherein the correlation means is adapted to determine the differentiated correlation signal from the differentiated received signal and the differentiated reference signal.

33. An arrangement according to any one of claims 24 through 31,

wherein the correlation means is adapted to determine a correlation signal from the received spread-spectrum signal and the reference signal; and

wherein the means for differentiating is adapted to differentiate the correlation signal to obtain the differentiated correlation signal.

34. An arrangement according to any one of claims 24 through 33, wherein the means for differentiating a signal comprises a multiplier (303,403,406) for multiplying a signal sample of the signal with the complex conjugate of a preceding signal sample.

35. A device comprising an arrangement according to any one of claims 24 through 34.

36. A device according to claim 35, wherein the device is a receiver for use in a Global Positioning System.

37. A device according to claim 35, wherein the device is an autonomous GPS receiver.

38. A device according to claim 35 or 36, wherein the device is a communications device.